CANADIAN JOURNAL of URBAN RESEARCH
REVUE CANADIENNE *de* RECHERCHE URBAINE

Climate Change, Urban Responses and Sociospatial Transformations: The Example of Quebec City

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Abstract
The growing involvement of cities in the fight against climate change is probably one of the most significant features of today's environmental governance. Beyond contributing to mitigation and adaptation efforts, urban climate action also helps in understanding how urban societies and spaces are being transformed in a context of global environmental change. This paper looks in particular at these sociospatial transformations, by presenting an empirical research on Quebec City's climate policy. Since 2004, Quebec City has implemented various mitigation initiatives, but without being able to reduce its emissions. In fact, its policy approach has been mainly symbolic and has not encouraged the institutionalization of the climate issue in planning and governance practices. The case of Québec City shows that climate change is contributing to the renewal of environmental policies, but it also highlights the difficulty of decarbonizing urban socio-technical systems that have mainly developed around automobility.

Keywords: urban climate action; green urban entrepreneurialism; ecological modernization; urban climate mimicry

Résumé
L'implication grandissante des villes dans la lutte aux changements climatiques est probablement une des caractéristiques les plus significatives de la gouvernance environnementale actuelle. Au-delà de contribuer aux efforts d'atténuation et d'adaptation, l'action climatique urbaine permet aussi de comprendre comment les sociétés et les espaces urbains se transforment dans un contexte de changements environnementaux globaux. Cette contribution se penche notamment sur ces transformations sociospatiales, en présentant une recherche empirique sur la ville de Québec. Depuis 2004, Québec s'est doté de diverses initiatives en matière d'atténuation, sans toutefois être en mesure de réduire ses émissions. La démarche de l'administration municipale a été surtout symbolique, et n'a pas favorisé l'institutionnalisation de l'enjeu climatique dans la gouvernance et la planification. Le cas de Québec montre que les changements climatiques contribuent au renouvellement de l'action environnementale, mais souligne aussi la difficulté à décarboniser des systèmes sociotechniques urbains qui se sont développés essentiellement autour de l'automobilité.

Mots clés : action climatique urbaine; entrepreneurialisme urbain vert; modernisation écologique; réflexivité urbaine

Canadian Journal of Urban Research, Winter 2019, Volume 28, Issue 2, pages 1-15.

ISSN: 2371-0292

Introduction: The Climate Is Changing, The City Too

Across the globe, climate change is increasingly targeted by local policies and actions, whether in terms of improving energy efficiency, greening spaces, enhancing public transit or reducing urban sprawl (Aylett 2014, Bulkeley 2013, Castán Broto and Bulkeley 2013, Guyadeen et al. 2017, Hughes, Chu and Mason 2018). In Canada, more than half of the population lives in cities that are formally engaged in climate action (FCM 2019a), and in 2017, the Federal Government has launched a five-year program to subsidize municipalities for mitigation and adaptation measures[1], the Municipalities for Climate Innovation Program (FCM 2019b). The multiplication and diversification of urban responses to climate change are considered, by some careful observers, as one of the most significant features of climate governance in the last two decades (Bulkeley, Castán Broto and Edwards 2012: 2).

According to Bulkeley (2013), the expansion of this phenomenon has produced three major effects. The first is substantive and concerns the contribution of local actions to global efforts in the reduction of vulnerability and greenhouse gases (GHG). The second relates to the influence of urban initiatives on national and global policy. In fact, governments and international institutions now consider the important contribution of municipalities and sometimes take inspiration from their best practices. The third effect consists in a sociospatial reconfiguration of the city, which is increasingly governed, planned and lived in taking into account both risks and opportunities related to the climate issue (Anguelovski and Carmin 2011, Bulkeley 2013. Hodson and Marvin 2010). This third type of effect can be called reflexive, since it highlights the fact that the climate issue is increasingly come "to feature in the imagination and creation of urban futures" (Bulkeley 2013: 4).

This transition to more resilient and low-carbon cities (Bulkeley et al. 2013) has given rise to different, if not divergent, explanations. On the one hand, it has been interpreted as an "urban ecological modernization" (Scanu 2015): a reflexive reconfiguration of urban institutions and spaces in response to the challenges of "late modernity" (Beck 2010, Giddens 1990), whose climate change is the most illustrative example. On the other hand, some authors associate urban climate action with an intensification of urban entrepreneurialism (Hodson and Marvin 2017, While, Jonas and Gibbs 2004), since the consideration of climate change has become an essential prerequisite for urban reproduction and capital accumulation (Hodson and Marvin 2010). However, this particular treatment of the climate problem has led to a narrowing of urban sustainability and, more particularly, to the marginalization of social justice issues (Hodson and Marvin 2017).

In the light of an empirical study of climate action in Quebec City, Canada, this paper aims to explore urban responses to climate change and to shed some light on how cities are changing in a context of global climate challenges. Firstly, the goal is to identify the form and content of Quebec City's climate policy, with special attention given to governance and planning instruments, actors involved, policy themes, actions and outcomes. Secondly, this paper focuses on the reflexive effects of this policy. More precisely, the aim is to understand if this local response to the climate problem has triggered institutional as well as spatial transformations. On the one hand, the paper asks whether an institutionalization of the climate issue is underway (Anguelovski and Carmin 2011, Roberts 2009). This could for example be observed by the introduction of new governance and planning instruments (e.g.: climate test for urban projects), the production of expert knowledge (e.g.: new data on local vulnerabilities) or the diffusion of social practices (e.g.: modal transfer in transportation). On the other hand, the paper focuses on the effects of this climate policy on Quebec City's spatial development, and more particularly on changes affecting infrastructures, natural areas, technologies and, more generally, the urban form (i.e., densification and the slowing down of urban sprawl).

Quebec City was one of the first Canadian municipalities to focus on the climate issue, it then developed various plans and measures, especially regarding mitigation. However, this engagement turned out to be essentially symbolic in nature, because of a significant gap between discourses and actions (Krause 2010, Lyon and Montgomery 2015). Quebec City's approach to climate change can then be defined as an "urban climate mimicry": following a general trend that makes the fight against climate change an important element for local development and interurban competition (Scanu 2015, Davidson and Gleeson 2014, Hodson and Marvin 2010), the municipal administration has adopted a climate-friendly approach without, however, really wanting to be involved in substantive mitigation and adaptation efforts. The case analyzed in this paper shows that if it is correct to say that the climate issue is increasingly taken into account in urban governance and planning, this process is however not always associated to beneficial outcomes for the fight against climate change nor to changes in urban institutions and spaces as highlighted by recent literature in this regard.

Data used in this paper are the result of about ten years of research on climate change-related policy in Quebec City. More precisely, research has been conducted between 2009 and 2018 through analysis of the press, plans, fact

sheets and websites. Data was then explored through thematic content analysis in order to gather information on the three main climate initiatives of Quebec City from 2004 to 2018: the first GHG reduction plan, the Sustainable Mobility Plan and the second GHG reduction plan. In the analysis, particular attention has been given to the following dimensions: types of plans, goals, governance modes, actors, sectors, actions and themes.

After this introduction, the paper will present literature on urban climate action, its evolution as well as its effects on urban development and organization. It then focuses on two diverging but complementary theoretical perspectives on this phenomenon: ecological modernization and urban political ecology. The following sections will present Quebec City's climate policy, and then identify its key aspects and try to understand if and to what extent this city is adjusting its institutions and spaces to the challenges of climate change. The conclusion will focus on the main results of the study and then will sketch some possible intervention and research avenues that should be explored.

Urban Climate Action: Rise, Institutionalization and Transformation

It was at the very beginning of the 1990s that pioneer cities like Toronto, Canada, Leicester, United Kingdom, or Bologna, Italy, entered the "unexplored" territory of climate policy. Since then, urban responses to climate change have spread and diversified all around the world in the form of plans for mitigation and adaptation, citizen initiatives of urban agriculture, the incorporation of climate criteria in master development plans, the involvement of business in energy decarbonization and so on. Bulkeley and his colleagues have identified two major phases in the evolution of this phenomenon: "municipal voluntarism" and "strategic urbanism" (Bulkeley 2010, 2013, Bulkeley, Castán Broto and Edwards 2012).

In the phase of municipal voluntarism, initiatives focused mainly on reducing GHG emissions in the energy sector, particularly through better management of administrative operations and staff. In some cases, they mainly consisted in *ad hoc* measures that did not involve communities and that were isolated from or marginal to pre-existing political and economic priorities. In other cases, these initiatives were limited-scale pilot projects aiming to generate interest in the climate issue or to demonstrate the feasibility and effectiveness of some projects, such as buildings with exemplary energy performances. In short, urban climate actions of this early period were mainly symbolic in nature, and sometimes consisted of statements or projects that were not translated into substantive or effective measures.

As with planning more generally, climate change planning can face many challenges when it comes to implement planned orientations, measures and projects. In this respect, Krause (2010) makes a distinction between substantive and symbolic climate policy. The former can have the effect of reducing GHG emissions and vulnerability, while the latter are policies adopted in the absence of a real intention to implement them. Markus and Savini (2016 : 499) argue that "while implementation deficits seem inherent in regulating sustainable development there are three factors that structurally affect the way cities deal with these regulatory challenges: the level of scale at which regulations are established, the degree of land ownership which provides the margin of manoeuvre to public authorities, and lastly, the sense of political urgency behind mitigation and adaptation policies." Similarly, Burch (2010) singled out five types of barriers to urban climate action: regulatory, structural or operational, behavioral, contextual and capacity barriers. She adds that although financial and human resources can be crucial in respect to the implementation, they "are of far less significance to action on climate change than the path dependent institutional practices and complex cultures that characterize municipal governments" (Burch 2010: 295). More widely, this implementation deficit in urban climate governance and planning highlight the inflexible character of urban sociotechnical systems (Hommels 2005, Geels 2013), and therefore the difficulty of changing social practices and material contexts that are locked in "high carbon" urban development paths.

The situation regarding urban responses to the climate problem begins to change at the turn of the century, first because of the emergence and consolidation of many networks like Cities for Climate Protection, Partners for Climate Protection, C40 or Covenant of Mayors, which help municipalities by providing knowledge, skills and sometimes funding (Fünfgeld 2015, Kern and Bulkeley 2009, Gore 2010). The political will to counterbalance the modest outcomes of national and international climate governance is also at the root of this evolution (Bulkeley, Castán Broto and Edwards 2012, Selin and VanDeever 2009). A third factor concerns the diffusion of a "win-win" perspective which considers the fight against climate change as a strategic issue (Hodson and Marvin 2010), and thus emphasizes the possibility of aligning the imperatives of urban development such as quality of life and competitiveness with climate adaptation and mitigation. In a sustainable development perspective, the fight against climate change has begun to be considered as an activity likely to generate environmental, social, and, above all, economic benefits (Davidson and Gleeson 2014, Scanu 2015, Scanu and Cloutier 2015, Sippel and Jenssen 2009).

During this period, adaptation receives increasing attention. However, the lack of data on local vulnerabilities that policy-makers often face results sometimes in isolated efforts (emergency measures), rather than in more comprehensive and long-term action (regulations for water protection, modernization of infrastructures, etc.). On the mitigation side, there is the spread of cross-cutting interventions targeting multiple sectors simultaneously, such as waste management, transportation and taxation, even though energy issues still occupy a privileged place (especially in Europe). This second phase is characterized by multicentered and more participative planning and decision-making processes, as well as the adoption of a "smart regulation," namely a heterogeneous combination of modes of governance (Alber and Kern 2008, Scanu 2015). Main initiators and leaders of these initiatives are public authorities, although the involvement of business and civil society stakeholders has increased in recent years (Castán Broto and Bulkeley 2013).

As pointed out in the introduction, what is interesting about the evolution of urban climate action is not only its contribution to a more resilient and low-carbon society, but also its reflective effects on the "urban" itself, that is to say the way the climate issue is transforming urban institutions and spaces (Anguelovski and Carmin 2011, Scanu 2015, Bulkeley 2013, Hodson and Marvin 2010, Roberts 2009). At the institutional level, examples of these kinds of changes are new governance instruments (e.g.: climate tests), the modification of the structure of the municipal administration (e.g.: climate units), new budgets explicitly dedicated to the climate problem (e.g.: climate funds), the integration of climate criteria in urban master plans (e.g.: energy performances), modal transfer in urban mobility (e.g.: growth in public transit users), new regulations promoting local agriculture, etc. At the spatial level, theses changes can involve new green and resilient infrastructures (e.g.: water retention basin to face heavy rainfalls; cycling paths), eco-districts, new low-carbon technologies (e.g.: electric tramways), facilities for a greener treatment of wastes (e.g.: biomethanation complexes), the slowdown of urban sprawl, the growth of urban canopy, the adjustment of urban carbon metabolism (e.g.: reduction in GHG emissions), etc.

In the phase of municipal voluntarism, the lack of institutional landmarks related to climate policy led authorities to use traditional instruments and methods from planning or management of municipal services (Anguelovski and Carmin 2011: 173). In this sense: new challenges were faced through old approaches. The second phase, however, is characterized by an opposite movement of experimentation and innovation aiming at organizing and developing the city towards the goals of low carbon and resilient urbanism (Bulkeley Castán Broto and Edwards 2012). "Central to the institutionalization of urban climate action is the development of regulations, policies, codes, and support programs. Such institutions provide formal guidelines and informal behavioral norms that enhance predictability, establish order and, at times, promote cooperation" (Anguelovski and Carmin 2011:170). Bulkeley (2013: 229) describe very well these reflexive effects of urban responses to climate change, arguing that "new forms of mobility, energy provision, architecture, urban regeneration scheme, community action and everyday behavior have been created in cities in response to the challenges of GHG emissions. In this manner, climate change is serving for reconfiguring the city, producing new forms of urbanism that jostle alongside existing urban structures, political economies and cultures."

But while it is true that the climate is changing urban governance and planning, this is not always the case. First, municipal efforts can be counterbalanced by extra-urban forces, such as decisions made at other levels of government (e.g.: deregulation in the transport sector) or changes in the global economy (e.g.: lower oil prices). Second, there are also endogenous barriers to urban climate action. These can relate to the phase of engagement, namely the beginning of municipal implication in climate initiatives, as well as to the phase of implementation, that is to say the substantive realization of a plan and the achievement of its objectives. However, these do not have the same weight, since "whereas joining a climate-protection network and/or adopting official emissions-reduction policy are relatively low-cost acts, the implementation of such policies entails higher costs" (Krause 2010: 47). These are some issues this article tries to explore by analyzing the case of Quebec City.

The transition to low-carbon and resilient urban development (Bulkeley, Castán Broto, Hodson and Marvin 2013) could be seen as a significant aspect of a broader process of reflexive modernization (Beck 2010, Giddens 1990, Stevenson and Dryzek 2012), and more precisely, of ecological modernization (Mol 1996, Mol, Spaargaren and Sonnenfeld 2014, Spaargaren and Mol 1992). In social sciences, and especially in environmental sociology, ecological modernization is understood at the same time as a theoretical approach and as an empirical phenomenon (Scanu 2015, Christoff 1996). As a theoretical approach, ecological modernization studies how modern societies cope with ecological problems through institutional and technological reforms, whether by sustainability policy, urban planning, industrial restructuring or technical innovation. As an empirical phenomenon, ecological modernization is

understood as an historical phase, namely a second modernity that is more ecological than its predecessor, i.e., first modernity. More specifically, this phenomenon is associated with the institutionalization of environmental issues, that is to say the incorporation of ecological concerns into social, political, cultural, industrial and economic spheres of activity.

Accompanying this reflexive modernization is a willingness of emancipation from production and consumption patterns whose negative effects are now demonstrated, and the consequent awareness of societal visions which are alternative to those to which social actors have been socialized (Stevenson and Dryzek 2012: 192). At the urban level, ecological modernization involves both questioning "obsolete" models of development and the search for sociospatial solutions more adapted to the challenges of global environmental change. In other words, urban ecological modernization could be seen as the incorporation of "climate rationality" into discourses, decisions, actions and practices with the goal of dematerializing and decarbonizing urban development (Scanu 2015). As for ecological or environmental rationality (Dryzek 1983, Mol 2002, Spaargaren et al. 2000), climate rationality refers to the emergence and autonomization of a climate perspective which drives and justifies governance and planning choices. In this sense, climate rationality joins, and sometimes challenges, other kinds of rationalities like the economic, instrumental and communicative ones.

If the climate issue is changing the city, many observers argue that urban policies consist mainly in temporary or even cosmetic adjustments. According to these critics, the underlying logic of urban development has hardly changed, as it remains the economic one which is at the core of neoliberal paradigm (Davidson and Gleeson 2014, While, Jonas and Gibbs 2004). Many authors have highlighted what they call the "entrepreneurial treatment of urban environmental problems," that is a tendency to focus on ecological issues that are most compatible with the imperatives of growth advocated by economic and political elites, like competition, commodification, positioning, exemplarity, privatization, innovation, creativity, attractiveness, replicability, etc. (Béal 2009, Béal and Pinson 2014, Hodson and Marvin 2010, 2017).

Research on urban responses to climate change has pointed out that economic considerations are very often the "hard facts" of municipal engagement (Sippel and Jenssen 2009: 18). Many authors have addressed this issue, identifying a number of factors that motivate these responses (Bulkeley 2013, Kousky and Schneider 2003, Sippel and Jenssen 2009, Scanu et al. 2015). These studies have shown that decisions are often made in a utilitarian perspective, that is, actors get involved when they perceive benefits that are not strictly related to the climate problem as such, but to other urban issues such as public spending, the development of new technologies, the reduction of road congestion, or the improvement of the quality of life. These studies also agree that while political, geographical or cognitive factors can play an important role, economic arguments are the main factors that trigger and justify urban engagement in climate action.

On the one hand, the extent acquired by urban responses to climate change is interpreted as the evidence of a process of ecological modernization (Mol, Spaargaren and Sonnenfeld 2014), an institutional and technological reaction to environmental challenges of late modernity which foster the updating of urban societies and spaces in a low carbon and resilient manner (Scanu 2015). On the other hand, urban climate action is understood as an approach that is both selective and opportunistic (While, Jonas and Gibbs 2004), and which unfolds according to potential gains arising from the exploitation of "valued ecologies" (Hodson and Marvin 2017). Although divergent, these two points of view are similar in that they agree on the fact that the climate issue is becoming institutionalized within urban governance and planning, although with intensities and outcomes that could widely vary between contexts and initiatives. It is with these theoretical and conceptual premises that the case of Quebec City will be analyzed. The aim is to document its responses to climate change from 2004 to 2018 in order to highlight their main dimensions and particularities, and to look for the presence of sociospatial transformations.

Quebec City's Climate Action

Capital of the Canadian province of Quebec, Quebec City is a medium-sized agglomeration located on the north shore of the Saint Lawrence River. Apart from the historic central district which makes it one of the most European cities on the continent, the urbanization of Quebec City is similar to that of other agglomerations in Canada and the United States, because it is characterized by the strong presence of urban sprawl and of a highly developed road network (Dufaux, Labarthe and Laliberté 2013, Guay and Hamel 2010, 2014). As for many North American cities, low density and long commuting distances largely explain Quebec City's carbon footprint, as well as the predominant role of transportation in the production of GHG emissions (Hoornweg, Sugar and Trejos Gomez 2011, Banister 2011).

In Canada, municipalities have authority on many sectors and services such as land use, waste management, transportation, green spaces and taxes, which enable them with "direct control, indirect control or influence over approximately 52% of domestic gas emissions" (Robinson at Gore 2005: 105; see also Burch, 2010). Canadian municipalities can therefore act effectively in both mitigation and adaptation. However, as already pointed out, it should be noted that the willingness and ability of a municipality to implement climate policies depend both on endogenous factors, such as local resources and priorities, and on exogenous factors, like regulatory frameworks or subventions made available by the provincial and the federal government (Alber and Kern 2008, Jones 2011, Scanu and Cloutier 2015).

The First GHG Reduction Plan (GHGRP1)

Québec City's climate commitment begins the same year the Kyoto Protocol was signed, in 1997, when it joined the Partners for Climate Protection Network, a program of the Federation of Canadian Municipalities which helps local governments in climate planning. This turned out to be essentially a rhetorical act, as Quebec City has never submitted an inventory or an action plan, as Montreal and Vancouver done (FCM 2019a). It is rather in 2004 that the city council adopts its first climate initiative, the *Plan de réduction de gaz à effet de serre 2004-2010* (GHG Reduction Plan 2004-2010) (GHGRP1).

Elaborated by an ad hoc committee with the collaboration of various municipal services, as well as provincial and federal agencies, the GHGRP1 is a technical document based on an emissions inventory that sets reduction goals and plans actions to achieve them. It does not concern community's GHG emissions, but only "corporate emissions," i.e., those originating from municipal activities, staff and buildings. The mitigation target is set at 22.3%[2] compared to 2002 and is expected to be achieved in 2010 through measures that focus primarily on waste management, which accounts for 83.4% of the municipal administration carbon footprint[3]. The remaining emissions are generated by motorized equipment (10.8%), wastewater treatment (3%) and building management (2.7%).

The plan includes major projects such as improved recycling and recovery, biogas capture and the installation of a bioreactor. Other measures target motorized equipment (purchasing less polluting vehicles), buildings (improving heating systems), lighting (replacement of traffic lights with LED lamps), and the activities of the public transit operator, the *Réseau de transport de la Capitale* (RTC) (training of drivers). While the GHGRP1 focuses exclusively on municipal activities, it also mentions parallel initiatives that will help reduce emissions of the agglomeration, such as the Master development plan, a campaign to raise awareness about car idling and improved public transit.

The need to reduce costs and generate savings is at the heart of the GHGRP1. Planned actions will not only reduce emissions, but also the energy bill and municipal expenses. The plan announces an investment of more than $5 million, with savings estimated at more than $3 million for the municipality and $12 million for the community. Much of the investment is covered by external grants, among which the *Climat Municipalité* program, included in the first Climate Change Action Plan of the provincial government[4]. While economic issues largely orient its strategy, the GHGRP1 is also keen to generate positive spin-offs for its residents: "this action plan will not only help fight climate change, but also improve [...] the quality of life of citizens" [5](VdQ 2004: 1).

The intentions of the GHGRP1 are certainly laudable, however, its outcomes are not. The 2011 report of the Auditor General of Quebec City shows that only 21% of the reduction target was achieved, and especially that the plan was designed in such a way that planned measures, even if implemented adequately, were not sufficient to reach the targets (VdQ 2011a). This report adds that the administration is not able to present a balance sheet of costs and benefits, nor to document the progress of each project. This is an evaluation that will be considered by the planners in the second mitigation plan, published in 2014. The latter raises four major statements: "insufficient number of projects compared to the target set; lack of clear definition of the roles and responsibilities of the stakeholders; inadequate performance monitoring mechanisms; gaps in accountability"[6] (VdQ 2014).

The poor results of the GHGRP1 are probably due to the "exploratory" nature of the planning process. Quebec City is the first major city in the province to have a mitigation plan, so its planners have worked in an almost unknown terrain. The desire to focus exclusively on municipal operations without involving the community is also understandable. In fact, self-governance is usually the starting point for urban climate action, because it concerns the management of activities over which a municipality has direct control, and which are therefore much easier to decarbonize than residents' behaviors. That said, corporate emissions usually represent a small part of a city's total emissions. Therefore, an effective initiative should also consider community activities, including transport habits.

The Sustainable Mobility Plan (SMP)

The Sustainable Mobility Plan (SMP) is probably Quebec City's most important mitigation initiative, even if its main goal is not to curb climate change, but to green the transportation system. In the agglomeration, motorized travel is responsible for the vast majority of total GHG emissions[7], so this policy is an excellent means for fighting climate change. Released in 2011 after almost three years of planning, the SMP is largely the outcome of the work of the Sustainable Mobility Working Group and, to a lesser extent, of the contribution of the community, which has been invited to comment on the plan through public hearings and online surveys.

Unlike a more technical document such as the GHGRP1, the SMP proposes a long-term vision concerning the development of the agglomeration: its purpose is "to contribute to make Quebec City an attractive, prosperous and sustainable region, which is illustrated in particular by a strong integration of land use planning and transportation and by a population which favors active and public transport" (VdQ_2011b). In addition, there is the need to ensure accessibility and fairness, as well as to reduce GHG emissions and pollution. Concerning the strategies, the SMP is based on an integrated approach[8] and puts emphasis on sustainability principles, densification, functional diversity, the fight against urban sprawl and the increase of public and active transportation. Despite these many goals, it sets only two measurable targets: increasing the modal share of public and active transit by 20% and 17% respectively. The plan also endorses the provincial reduction target of 20% of GHG emissions by 2020.

While the SMP presents a large number of strategies, recommendations, instruments and actions, it essentially boils down to a tramway network project, which is considered to be the sine qua non condition of a transport system that aims to orient future development according to sustainable principles. The tramway is also the most controversial project of the plan. Three major perspectives emerged in the public debate about this infrastructure (Scanu 2014). The first, related to the promoters of the plan, namely the municipality and the Working Group, considers the tramway as a vector of growth, and thus sets its path in the lower city where the presence of vacant lands offers a very high potential for real estate development. The second perspective, that of business actors, agrees with the previous one, but it adds that the tramway should not weigh on the taxpayer's wallet, nor should it be a brake on automobility (i.e., less parking or traffic lanes). The third perspective focuses on equity and is propounded by a heterogeneous set of individual and collective actors. It sees the tramway mainly as a means of reducing traffic congestion and improving accessibility. The proposed route is therefore the one in the upper city where public transit has almost reached a saturation point.

Unlike the GHGRP1, the SMP envisions a multimodal governance approach: awareness campaigns, taxes, incentives, new services and infrastructures. It is not limited to municipal operations because it seeks to actively involve the community both upstream in the planning process and downstream in the implementation phase. In this sense, the SMP envisages a sociospatial change for the whole agglomeration. These good intentions did not, however, favor the implementation of the measures or the achievement of the objectives. Here, it suffices to mention: the dropping of the tramway project and of the Bus Rapid Transit (BRT) project which should replace it; the failure to curb urban sprawl, as no regulation has been produced in this regard, and the new master development plan envisages further spatial expansion; the decrease in public transit users; the mayor's refusal to follow certain recommendations of the SMP such as the introduction of a gas tax to finance public transit. This partial implementation of the orientations and recommendations of the SMP is mainly due to the choice of planners and decision makers to avoid measures that could disappoint its electorate. The latter, which represents a large part of the population of the agglomeration and which resides mainly in the suburbs[9], is not very favorable to quit "high carbon" habits to "live and move otherwise" [10] (VdQ_2011b).

Like the GHGRP1, the SMP has had little impact on mitigation. However, it has had the great merit of having started a debate on transport problems affecting the region, and of having made the population aware of more environmentally friendly modes of mobility than cars. The recent decision to build a new public transit system which includes a tramway circulating in the upper city also suggests that the SMP may be about to bear fruit (see the conclusion).

The Second GHG Reduction Plan (GHGRP2)

Released in 2014, the 2011-2020 GHG Reduction Plan (GHGRP2) is the latest mitigation initiative in Quebec City. Developed by the environmental department with the collaboration of administrative units of the agglomeration and the RTC, this plan aims to overcome the difficulties of the GHGRP1 and to "devote the necessary efforts to improve its strategy allowing it to concretely reduce GHG emissions" (VdQ_2014: 20). It plans the creation of a working

group that ensures the progress of the work and produces annual reports on its implementation. Another important measure is the introduction of indicators to monitor the achievement of goals.

Like its predecessor, the GHGRP2 focuses solely on municipal activities, and sets a 10% mitigation target for 2020[11]. Four key principles guide its strategy: awareness of municipal authorities; coordination role for the environmental service; implementation at the best possible cost; clear and known accountability procedures. The plan includes a total of nineteen measures, most of which focus on waste management, which is still the sector producing most of CO2[12] These measures include an improved program for the selective collection of recyclable materials, the optimization of the system for capture and thermal destruction of landfill biogas, the conversion of heating systems for municipal buildings, the acquisition of hybrid buses for the RTC and the development of an eco-driving training program for municipal employees. Implementation costs are estimated at $117 million, which is 23 times more than the costs for the GHGRP1. The plan also takes into account the monetary spin-offs from reducing emissions but does not calculate them.

Savings and image improvement are the main arguments supporting the plan. The first concerns the direct effects of the measures: "this mitigation plan has been drafted to take advantage of opportunities such as the recurring renewal of the RTC's fleet of municipal vehicles or buses, the annual maintenance of buildings and urban infrastructures, with a view to reducing costs for the organization" (VdQ_2014: 21). The second argument relates to the indirect benefits for the quality of life or the reputation of the city: Quebec City wants to be "recognized for its leadership and its effectiveness in reducing GHG emissions" (VdQ_2104: 36). The GHGRP2 discourse articulates then around a win-win rhetoric that sees climate action as an opportunity to generate economic and environmental benefits.

Concerns about feasibility have led planners to focus on "no regrets" measures: rather simple to achieve and expected to produce benefits regardless of the amount of emissions cut. It is to ensure its success that the plan does not apply to the activities of the community, but only to those of the municipality. The reason for this choice is primarily technical: the resources have been channeled "where the municipal organization can really make gains [...], [that is to say on activities on which it has a] real power of intervention" (VdQ_2014: 21). But there is also a reason of political nature, because a plan that asks citizens to make efforts in the fight against climate change could cause a deficit of political legitimacy, especially in an urban region with quite a conservative culture like Quebec City.

At this point, it is still difficult to assess the progress of the GHGRP2, as well as the achievement of its goals. Annual implementation reports and GHG emissions inventories have not yet been produced or made public. However, it is possible to make two observations. The first concerns the goals, while the second relates to the means. Like the GHGRP1, the main problem with the GHGRP2 is the decision to focus only on municipal activities[13]. In fact, the latter account for a small 6% of the GHG emissions of the agglomeration, which are mainly due to residents' mobility choices. So, the 10% reduction target will result, if achieved, in an almost imperceptible reduction of about 0.5% of all CO2 produced by Quebec City. Regarding the suitability and feasibility of the measures planned, it is worth mentioning that the mitigation goal will be achieved mainly thanks to a new biomethanation plant. However, this facility will be finished building in 2022, namely after the expiry of the plan, and so it will not really be able to contribute to reduction efforts. Another downside that raises doubts about the effectiveness of the GHGRP2 is that this plan was expected for 2011, but it was approved much later, and so issued only at the end of 2014.

Although the deadlock of the GHGRP2 are clear, this plan represents a significant mitigation initiative, which tries to give a new impetus to Quebec City's climate commitment. On the one hand, it seeks to overcome the limits of its predecessor through the introduction of indicators and of a new model of governance (the working group and the pivotal role of the environmental service). On the other hand, it aims to ensure the achievement of objectives by developing measures that the municipality can manage directly and easily. While it is likely that the targets will not be met, this plan does have the merit of helping to raise awareness in municipal administration about the climate problem, and more particularly about issues of energy efficiency and of reduction of energy consumption. In this sense, it is an effort directed towards the institutionalization of the climate issue.

The Climate is Changing, and Quebec City?

Quebec City took an early interest in the fight against climate change, when it joined the pan-Canadian network Partners for Climate Protection in 1997[14]. Since then, its climate policy has been geared essentially towards reducing emissions and has been based on the three major initiatives[15]: two mitigation plans, the GHGRP1 and the GHGRP2, and a transport plan, the SMP (see Table 1). The former aims to improve the management of municipal services in

order to reduce both GHG emissions and costs. The latter wants to make Quebec City an attractive and prosperous urban region, which stands out for its quality of life. To this end, it proposes a long-term vision and a large number of orientations and measures to build a more efficient, accessible and low-carbon transportation system. Two important observations can be sketched out from these initiatives.

First, they proved to be far from adequate. For example, the two mitigation plans have not been planned correctly, a feature that does not only concern Quebec City, but other municipalities in Canada (Guyadeen et al. 2017). Furthermore, these plans target only corporate emissions, which alone represent a very small portion of the GHG emissions of the agglomeration. Then, even if implemented, the substantive benefits of these two plans would have been minimal in terms of mitigation. Secondly, these initiatives have not been fully implemented. For transportation, the abandonment of tramway and BRT projects, the refusal to introduce a gas tax to finance public transit, or the priority given to road fluidity through to the widening of highways, show a trend that goes against the principles of sustainable mobility. It should be noted that the new "public transit structuring network" (PTSN) (*Réseau structurant de transport en commun* in French) launched by the city council in March 2018 shows that this trend is probably changing (see the conclusion). As a result, the number of public transit users has slightly declined over the last five years (RTC 2018a, 2018b), while both corporate and community GHG emissions increased by 14% between 1990 and 2010[16] (see Table 2). These outcomes lead us to deduce that, although the climate problem has been addressed since 2004 through various initiatives and measures, Quebec's climate policy has not really led to sociospatial changes.

Table 1. Quebec City's Climate Action

	GHGRP1 2004-2010	SMP 2011-2030	GHGRP2 2011-2020
Type of plan	Mitigation	Transportation	Mitigation
Goals	Reduction of 60 kt CO2 eq	Increase modal part of public (20%) and active transport (17%)	Reduction of 23 kt CO2 eq
Modes of governance	Self-governance	Multimodal governance; public participation	Self-governance
Key actors	Municipal environmental department	Working Group on Sustainable Mobility, municipal departments, institutions, community	Municipal environmental department
Key sectors	Municipal services: waste management; motorized equipment; buildings	Diversified: transportation; land use planning; taxation; communication; etc.	Municipal services: waste management; motorized equipment; buildings
Key actions	Biogas capture; pilot test of a bioreactor at the incinerator	Tramway network; cycling path linking the downtown with the university campus	Biomethanation plant; selective collection program for recyclable materials; optimization of biogas capture
Key themes	Cost savings; improve quality of life	Improve attractiveness, growth, quality of life and accessibility	Cost savings; improve the reputation of the city

On the one hand, it is not possible to see the institutionalization of the climate issue: there is no equipment, budget or administrative units explicitly dedicated to the climate problem, on the contrary, the environmental department responsible for climate planning has recently been dismantled and incorporated into other municipal entities; the new master plan of the agglomeration does not really integrate climate concerns, but it allows a further expansion of the urban perimeter; mobility habits of the residents have not changed, as the car remains the dominant means of transportation and the number of public transit users has decreased. Furthermore, no new climate measures have been realized since 2014 (the last GHG inventory dates back to 2010), and no new initiatives in this regard are planned for the years to come.

Table 2. Québec City's GHG emissions between 1990 and 2010 (kt CO2 eq) (VdQ 2014.)

	1990	2006	2010
Corporate	216	227	246
Community	3 441	4 016	3 934
Total	3 657	4 242	4 180

On the other hand, Quebec City spatial development model remains the same of the last decades: road and highway networks continue to growth, to such an extent that Quebec is first in Canada by local road lane-km per 1000 capita and second by expressways lane-km per 1000 capita (TAC 2016); effects on urban carbon cycles are not visible, as GHG emissions continue to rise, especially because of the continued growth in motorized transport; urban sprawl has not been slowed down, and suburbs remain the most widespread residential choice (from 2006 to 2016, 98,5% of demographic growth took place in suburbs (CCU 2018)). Finally, no major public and active transit infrastructures have yet been built to encourage modal transfer, even if something is changing in this regard (see the conclusion).

Quebec City's approach is then mainly symbolic in nature, because there is a significant gap between discourses, statements and recommendations on the one hand, and decisions, actions and outcomes on the other. In other words, there is an inconsistency between the symbolic and substantive spheres (Krause 2010), and more generally an implementation deficit (Markus and Savini 2016). Furthermore, Quebec City involvement in the fight against climate change is motivated more by image concerns than by a desire to fight climate change. In this sense, the benefits of climate action do not stem from tangible results such as reducing emissions or vulnerability, but rather from self-promotion, namely presenting oneself as a committed municipality or even as a climate leader.

This particular approach could be called "urban climate mimicry," because the municipal administration recognizes the relevance of the climate problem and tries to comply with the climate norm, but without internalizing it. Following recent trends in urban sustainability, Quebec City joined a global trend where having a green image is more and more important (Davidson and Gleeson 2014; Hodson and Marvin 2010, 2017), and where the climate issue is increasingly associated with economic concerns that are today shared by many local governments: reduction of public spending, improving of attractiveness, competitive positioning, access to subsidies, etc. That can be seen as a particular kind of greenwashing[17] (Lyon and Montgomery 2015), notably in the form of unfulfilled promises (i.e., declarations without actions; targets not reached) and selective disclosure (i.e., highlighting municipal implication in climate actions without mentioning the outcomes).

This urban climate mimicry fits well in the paradigm of green entrepreneurialism (Davidson and Gleeson 2014, Béal 2009, While, Jonas and Gibbs 2004). Increasingly, municipal administrations recognize a strong complementarity between initiatives that are carried out under the banner of the fight against climate change and the economic development of urban regions. However, it is the prospect of generating economic spin-offs that firstly motivates this commitment. Quebec's approach is also selective, as planners have sorted out desirable actions based on potential gains. Issues such as equity and security, namely the social aspects of the climate issue, are absent or marginal.

Regarding Quebec City's mitigation plans, the only identifiable benefit not directly economic is the improvement of the quality of life; however, the latter is not quantified. Concerning the SMP, this is primarily oriented towards improving attractiveness. While it shows some interest in issues of accessibility and social mixing, that does not translate into measures or goals. It is probably also for these reasons that Quebec City does not have an adaptation policy, despite a pilot project started in 2009 which mainly aims to reduce municipal expenditures related to infrastructures maintenance (Scanu 2015). In this sense, the example of Quebec City also highlights current changes in urban environmental policy, and more particularly the transition from a holistic "governance of sustainability" to a narrower "management of carbon" (Béal and Pinson 2014, While, Jonas and Gibbs 2010).

The climate is changing, but Quebec City remains aligned on an anachronistic and unsustainable urban development trajectory oriented by principles of neoliberal urbanism and focused on the triptych "private car-highways-urban sprawl" that characterizes much of North America's urbanization patterns (Dufaux, Labarthe and Laliberté 2013, Guay and Hamel 2010, 2014). It is not possible to observe some reflexive effects, namely an urban ecological modernization towards a resilient and low-carbon urbanism that favors a green, compact and mixed habitat, as well as an efficient public transit network. In this sense, Quebec City's response to climate change fits more in the phase of municipal voluntarism than in the phase of strategic urbanism (see Bulkeley 2010, 2013, Bulkeley,

Castán Broto and Edwards 2012): the climate issue remains marginal in relation to urban development goals, or it is diluted in pre-existing concerns as reducing traffic congestion. A municipal vision or strategy to fight climate change is then absent.

These outcomes do not seem to reflect some lack of institutional or technical capacity, but rather the peripheral place that the climate problem, and sustainability more generally, has been granted by the administration as well as by the community. What seems to be missing is therefore political willingness. We have seen that this observation does not only concern decision makers, but also residents. Initiatives that call for changes in residential and commuting habits in the name of emission reduction, or that involve raising taxes to fund public transit infrastructures, are not welcomed in a city like Quebec, where the culture of automobility is dominant. It is probably for these reasons that the SMP did not produce the expected outcomes, and that community activities were never included in the two GHGRP.

But what explain these outcomes is not only local politics. In fact, the particular sociotechnical regime (Geels 2013, Hommels 2004) in which Quebec City is locked-in since more than half a century is also responsible. This regime consists of social and technical elements such as residents' preferences and behaviors, current regulations, existing infrastructure networks, choices of the past, a culture of automobility, the spatial features of the agglomeration and so on that contribute to make the transition to a resilient and low carbon urban development a rather arduous task.

Conclusion

Urban climate action is a relatively recent phenomenon, but one that has spread and changed rapidly in the last years. Today, it is rare to find a city that does not act in favor of this issue, or that has not implemented measures, even modest, in mitigation or adaptation. Recent theoretical and empirical works have highlighted the many effects of the rise and diffusion of this phenomenon (Aylett 2014, Bulkeley 2013, Castán Broto and Bulkeley 2013, Hughes, Chu and Mason 2018). While the growth of urban implication in the fight against climate change underscores the contribution of local actors and institutions to global efforts in mitigation and adaptation, it also represent a significant evidence of a deeper change in the governance of sustainability as well as in the dynamics of contemporary urbanization. Local decisions concerning land use, infrastructures, policy goals, economic development, fiscal choices and so on are increasingly being shaped by the problem of climate change (Anguelowski and Carmin 2011, Scanu 2015, Bulkeley 2013, Hodson and Marvin 2010).

However, as the case of Quebec City analyzed in this paper shows, if it is true that the climate is changing the city, that is not always the case. Despite two mitigation plans and a sustainable mobility plan, Quebec City's policy has been only partially implemented, and had no substantive effects on the sociospatial organization of the city. Quebec wishes to be a leader in the climate issue, but without getting enough involved: it wants to take advantage of an "eco-responsible" stance (i.e., showing engagement in climate issues), rather than from the substantive outcomes of the actions (i.e., reduction of GHG emissions or of municipal costs). These findings, coupled with the absence of other municipal initiatives, demonstrate the lack of a comprehensive and effective mitigation strategy, as well as a long-term vision for addressing climate change.

It is worth mentioning that this urban climate mimicry does not correspond to an absence of initiatives other than those of the municipal administration. For example, many local organizations are very active in the promotion of sustainable mobility and the benefits of public and active transit (Scanu 2014). There are also citizen associations that pursue adaptation goals through street level greening of different kinds of urban spaces, especially in central and denser districts (Cloutier, Papin and Bizier 2018). Similarly, it is possible to observe initiatives of biomass district heating system carried out by private developers, as in the *Cité Verte* (green city) district (Vision biomasse Québec 2019).

The key to unlock the sociotechnical regime that prevents Quebec City to start a transition towards a resilient and low-carbon development could be found in reflexivity, namely "the ability of a structure, process or set of ideas to change itself in response to reflection on its performance" (Dryzek 2014 : 938, see also Mol 1996). In this sense, a "reflexive city" "would recognize and learn from this failure and try to be something different" (Dryzek 2014: 943). It is necessary to point out that this reflexive process is not so much a matter of defining new models or prototypes, but of consciously transforming what already exists: rather than replacing existing urban spaces and institutions, these should be updated in order to adapt them to the ecological challenges of late modernity. Regarding this difficult task

of transforming barriers to urban climate action into enablers, Burch suggests that "the first step towards challenging an unsustainable development path is to identify critical sources of path dependency" (2010: 295). For this purpose, she puts emphasis on the organizational structure, culture and leadership of local governments, also highlighting the key role of assessing GHG emissions as well as local vulnerabilities.

In Quebec City, the recent unveiling by the city council of a new infrastructural project, the PTSN, which has received financial support from provincial and federal governments suggests a kind of reflexive turn. In short, the PTSN plans the construction of two major infrastructures: a 23 km tramway network and a 17 km BRT circuit. Both are electric, fast, high frequency and with a dedicated site. The new system will also include the addition of new bus routes and the construction of exchange hubs and incentive parking lots. The total cost is $ 3 billion, assumed entirely by the provincial and federal governments. The main effect of this network would be to promote the modal shift from the car to public transit, with beneficial effects on road congestion, which is expected to grow in the next few years if nothing is done. As for the SPM in 2011, the planning project concerning the PTSN included several public participation sessions. However, what differentiates it from the previous experience is the presence of civil society actors in the planning committee responsible for the project, on the one hand, and the choice of the upper city as the path of the new tramway, on the other hand.

While the slogan "on the way to modernity" is not, in itself, a guarantee of an impending ecological modernization of Quebec City's sociotechnical system, this project represents a major initiative, whose success will strongly depend on the willingness of both citizens and decision makers. This could be associated with a new mitigation plan that should, however, necessarily include community emissions. Concerning adaptation, it is likely that problems linked to the protection of drinking water sources, which the agglomeration is currently facing, will lead the city council to adopt more comprehensive and stronger measures. One solution could be to make the fight against climate change a strategic issue, and therefore to embed it into major projects and planning instruments. Such a strategy could include and encourage citizen initiatives that are already taking place in the agglomeration. These climate experiments are likely to contribute to both the fight against climate change and the social and economic development of the community.

Other research on governmental and citizen initiatives in Quebec City, as well as in other urban centers in Quebec and Canada, is increasingly needed. The relevance of these studies is not just a matter of identifying factors that can hinder or promote the development of more resilient and low-carbon cities. In fact, the scale that urban climate action has gained in recent years makes it a key phenomenon in understanding urban sustainability, and indeed in grasping the many ways in which urban spaces and societies are changing in a context of global environmental challenges.

Acknowledgments

The author wishes to thank the two anonymous reviewers for their insightful comments.

Notes

1 According to the Intergovernmental Panel on Climate Change (IPCC 2014a: 4, 2014b: 5), mitigation is "a human intervention to reduce the sources or enhance the sinks of greenhouse gases", while "adaptation seeks to moderate or avoid harm or exploit beneficial opportunities" of climate change.

2 The planned reduction is of 60,629 tons of CO2 equivalent.

3 It should be noted that these are the emissions produced only by the municipality, because de main source of emissions in the agglomeration is transportation (see later in the paper).

4 In Quebec, about 350 municipalities have benefited from subventions provided by this program.

5 All citations from French sources have been translated by the author.

6 The plan included 44 actions, of which 21 were completed, 13 were in progress and 10 have never been started.

7 In 2010, transportation accounted for 75% of GHG emissions of the agglomeration, with road transportation accounting for 45%.

8 A combination of transportation and land use planning.

9 Recent municipal and provincial elections (Elections Québec 2018, MAMH 2018), as well as a recent surveys on transportation (VdQ 2017), attest to the presence of a sociospatial divide in the agglomeration: conservative parties are more successful in the suburban area, where there is weak support for public transit, while more progressive parties are more successful in the central neighborhoods, where support for public transit is much higher.

[10] The SMP slogan.
[11] The planned reduction is of 23 082 tons of CO2 equivalent.
[12] The GHGRP2 also presents the community's emissions inventory but does not plan actions in this regard. Emissions are divided into the following sectors: transportation 75% (road transportation 45%); commercial and institutional 15%; residential 10%; the remaining 5% is due to agriculture, industry, halocarbons, residual materials, septic tanks and solvents.
[13] The plan does not include GHG emissions produced by contracted services such as snow removal, construction and waste collection.
[14] Quebec City was also one of the first cities in the province to have a pilot project on adaptation (see Scanu and Cloutier 2015).
[15] The GHGRP1 has been produced under the administration of mayor L'Allier, while the SPM and the GHGRP2 have been published under the administration of mayor Labeaume, in charge since 2007.
[16] This is a rough calculation because the inventories have been elaborated in different manners and they should be compared with caution.
[17] Greenwashing was initially associated with large corporations, or companies in general, that sought to green their image without necessarily taking concrete action for the environment (Lyon and Montgomery 2015). Over time, this practice has been adopted by other types of organizations, and municipal governments are not excluded.

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